

SC Tester

Development & Capabilities



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SC Tester

Development Goals



- Minimize station down time
- User-friendly operation (i.e., software)
- Data integrity

SC Tester

Initial Installation Test



- Hydrostatic

- Level change less than 1/4 inch in 24 hours or 0.00017361 inches per minute

SC Tester

Level Sensing Technologies



■ Visual

■ LVDT

■ Magnetostrictive

■ Sonar

■ Laser

■ Radar

■ Capacitive

■ Hydrostatic Pressure


SC Tester

SC Tester Utilizes



- Magnetostrictive probes with a base resolution of 0.00008202 inches
- DeviceNet digital interface to support up to 64 devices
- Virtual Instrumentation and Adobe Acrobat 5.0 software

SC Tester *Capabilities*



Probes range in resolution from 0.002 inches
to 0.00008202 inches.


SC Tester

Data Integrity



SC Tester is third-party certified (Ken Wilcox Associates, Inc.) to a minimum level change, MLC, of <0.0007 inches.

SC Tester *Capabilities*



Why the difference between the probe's
base resolution of 0.00008202 inches and
the system's MLC of 0.0007 inches?

SC Tester *Capabilities*



$$MLC = K * SD_p$$

K = tolerance factor which is approximately 2.4 for a probability of detecting a leak greater than 95% of the time

SD = standard deviation

SC Tester *Capabilities*



If the system operated with perfect precision, the MLC would be:

$$\text{MLC} = 2.4 * 0.00008202 = 0.000197 \text{ inches}$$

SC Tester has a MLC that is 3.5 times greater than the theoretical value

SC Tester

Conditions That Effect Precision



- Water surface tension
- Friction between probe and float
- “Noise” associated with vehicular traffic, turbine vibration, magnetic flux from electrical conduits, and environmental factors (rain, wind, etc.)

SC Tester *Capabilities*



If a probe had been chosen with a base resolution of 0.002 inches, WPI's MLC would have been:

$$\text{MLC} = 2.4 * 0.002 * 3.5 = 0.024 \text{ inches}$$

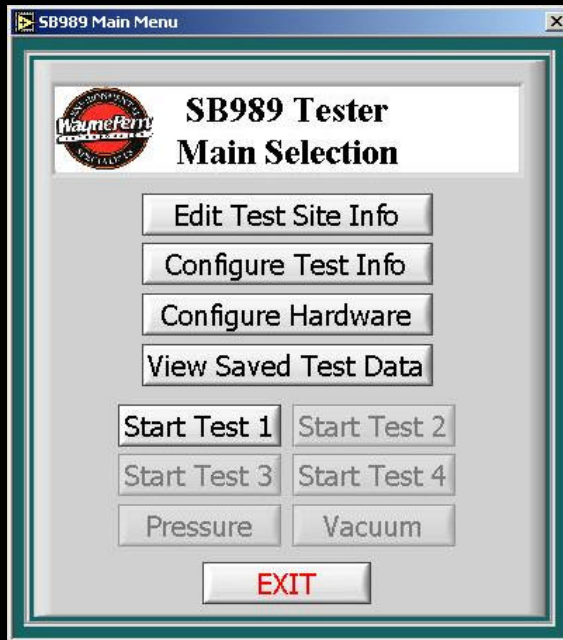
To conduct a test that is equivalent to a 1/4 inch drop in 24 hours would take 139 minutes or 2 hours and 19 minutes

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User Friendly Operation

SC Tester software:

- “Forces” user to enter all necessary site data



SC Tester

User Friendly Operation

SC Tester software:

- “Forces” user to enter all necessary test-specific data

The screenshot shows a window titled "Test Setup Information". It contains several tabs: "Test 1", "Test 2", "Test 3", "Test 4", "Vacuum", and "Press.". The "Test 1" tab is selected. Inside the tab, there are input fields for "Product 1" (value: 87), "Type 1" (value: Tank Sump), and "Location 1" (value: Fill). Below these, there are fields for "Test Length (min) 1" (value: 12), "Fluid loss limit (in) 1" (value: 0.0020), and an "Enable 1?" checkbox (checked). A "Done" button is at the bottom.

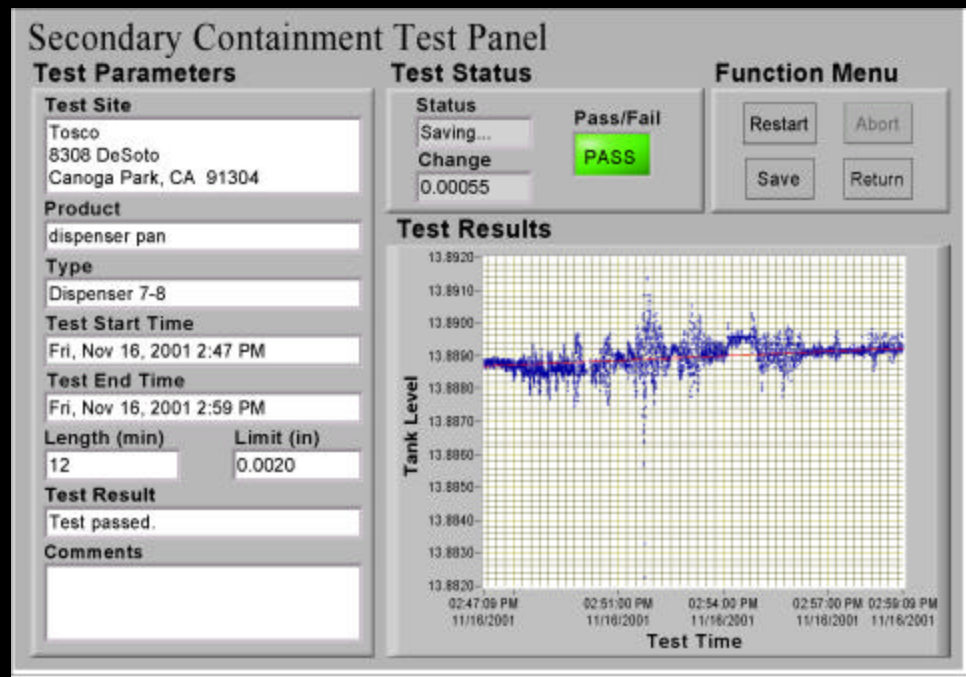
The screenshot shows a window titled "Hardware Configuration". It contains two sections: "DeviceNet Interface Configuration" and "DeviceNet IO Configuration". The "DeviceNet Interface Configuration" section has fields for "IntfMacId" (value: 0), "BaudRate" (value: 500000), and "PollMode" (value: Automatic). The "DeviceNet IO Configuration" section has fields for "DeviceMacId" (value: 63), "ConnectionType" (value: Poll), "InputLength" (value: 4), "OutputLength" (value: 0), and "ExpPacketRate" (value: 0). A "Done" button is at the bottom.

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User Friendly Operation

SC Tester software, continued:

- Graphically displays level change over time



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User Friendly Operation



SC Tester software, continued:

- “Forces” user to save test data before going to next test

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Data Integrity



- “Automatically” saves test using site and test-specific data as part of the file name along with a time and date stamp
- Saves all test in read-only PDF format to eliminate data manipulation from tester system
- Fails tests due to level change and excessive “noise”

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Summary of System



- Uses magnetostrictive level sensing technology
- Third-party certified MLC = <0.0007 Inches
- Performs a 0.002 inch level change test in 12 minutes

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Test Procedures



- Steam clean all sumps using FM 186
- Ventilate and check sumps for oxygen and vapor levels
- Re-install test boots and tighten penetration fittings
- Apply gasoline compatible sealant to “suspect” fittings
- Initiate hydrostatic testing